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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,293	06/25/2003	Harmeet Singh	LAM2P410	4867

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EXAMINER

KORNAKOV, MICHAIL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/607,293	Applicant(s) SINGH ET AL.	
	Examiner Michael Komakov	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-19 is/are rejected.
- 7) ☒ Claim(s) 16-19 is/are objected to.
- 8) ☒ Claim(s) 1-19 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>07/12/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-9, drawn to a method for semiconductor process chamber operation, classified in class 134, subclass 1.1
 - II. Claims 10-14, drawn to a method for cleaning a process chamber, classified in class 134, subclass 22.1.
 - III. Claims 15-19, drawn to a semiconductor processing chamber, classified in class 156, subclass 345.51.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions of Group I and Group II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention of Group I has separate utility such as etching the semiconductor wafer to produce semiconductor device. See MPEP § 806.05(d).
3. Inventions of Groups I, II and Group III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the processes, described by claims of Groups I and II can be practiced in apparatus with plasma generating means remotely located from

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semiconductor processing chamber, which is materially different from the instantly claimed apparatus.

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

5. Because these inventions are distinct for the reasons given above and the search required for Groups I, II is not required for Group III, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Mr. M. Gencarella, esq., on 01/28/2005 a provisional election was made without traverse to prosecute the invention of Group III, claims 15-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-14 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

8. Claims 15-19 are examined on the merits.

Specification

9. The abstract of the disclosure is objected to because it recites "A **method** for providing substantially similar chamber condition", however the instant claims are related to processing chamber. Applicants are also reminded of the proper format for an abstract of the disclosure. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details. Therefore, appropriate correction of the Abstract is required. See MPEP § 608.01(b).

10. Claims 16, 18 and 19 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. While disclosing semiconductor processing chamber, claims 16, 18 and 19 emphasize processing limitations in apparatus claims instead of providing structural elements, which would further limit a previous claim. Applicants are required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Objections

11. Claim 17 is objected to because of the following informalities: Claim 17 recites "the silicon coating". Apparently the silicon containing coating, as per claim 15, is indicated. Appropriate correction is required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

13. Claim 15, 16, 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Murugesh et al (U.S. 5,811,356).

Murugesh teaches a CVD chamber comprising components, such as a top,

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disposed on side walls; a base; a top electrode in communication with power supply; an exhaust passage; a substrate support (Fig.1; col.1, lines 42-67), wherein the components of the chamber are coated with a layer of silicon dioxide in order to seal the contaminants therein and reduce the contamination level during the processing (col.2, lines 48-57; paragraph, bridging col.3 and 4). The coating of Murugesh can be removed by cleaning (col.3, lines 55-64). Therefore, all the limitations of the instant claims are explicitly or inherently met by Murugesh.

14. Claim 15, 17, 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Koemtzopoulos et al (U.S. 6,071,573).

Koemtzopoulos teaches TCPTM reactor having a top electrode in communication with RF power supply; a base, side walls and a top, disposed on side walls; an outlet port; a substrate support, wherein the inner surface of the processing chamber is covered by removable silicon containing coating, the said coating traps particles sticking to the reactor interior surfaces. The thickness of the coating is in the range 2000A – 2 m (col.3, lines 22-29; col.3, lines 5-36,53-56; col.6, lines 20-23; col.7, lines 58-65; col.8, lines 42-45). Therefore, all the limitations of the instant claims are explicitly met by Koemtzopoulos.

15. Claims 15,16,18,19 are rejected under 35 U.S.C. 102(e) as being anticipated by Ho et al (U.S. 6,790,374).

Ho teaches a seasoned plasma reactor chamber, the interior surfaces of which

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are coated with a removable silicon containing seasoning polymer layer (Abstract, col.6, lines 5-22; col.10, lines 32-45; Fig. 2). Regarding the structural element of the processing chamber, such as a top electrode, a substrate support and an outlet for the removal of fluids, Ho teaches that a number of processing chambers of different sizes and configurations can be employed within the scope of his invention, for example, chambers, provided by U.S. 5,811,356 and U.S. 5,824,375, the descriptions of which are incorporated by references in the teaching of Ho (col.5, lines 51-66). The chambers of U.S. 5,811,356 and U.S. 5,824,375 include a top electrode in communication with a power supply, a substrate support and an outlet for removing of fluids. The silicon containing coating of Ho is fully capable of sealing the particles onto interior surfaces of the processing chamber(s). It should also be pointed out that because Ho teaches the waferless seasoning process (paragraph, bridging col.7 and 8), the entire interior surfaces or the plasma reactor chamber of Ho are inherently covered with silicon containing seasoning polymer layer. Therefore, all the limitations of the instant claims are explicitly or inherently met by Ho et al.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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17. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al (U.S. 6,790,374).

Ho does not specifically indicate the thickness of silicon containing coating. However, Ho teaches that if the coating becomes sufficiently thick, the flaking occurs, which contributes to particle contamination and on the contrary if the thickness of the coating is less than a minimal requisite content, such coating does not provide a desired processing result (paragraph, bridging col.10 and 11). Thus, Ho indicates that the thickness of coating is result effective while processing the semiconductor substrate.

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However, discovery of optimum value of result effective variable in known process is ordinarily within the skill in the art and would have been obvious, consult *In re* Boesch and Slaney 205 USPQ 215 (CCPA 1980).

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Muguresh et al. in view of Williams et al (U.S. 5,647,953).

Muguresh does not specifically indicates the thickness of silicon oxide coating. However, Muguresh teaches that "a thicker film of SiO₂ provides better isolation of chamber walls and lowers the metal contamination" (col.10, lines 36-39).

Williams teaches SiO₂ coating of interior surfaces of the CVD chamber and indicates that 3000A coating effectively traps metal particles (paragraph, bridging col.3 and 4). Therefore, one skilled in the art, motivated by the teaching of Williams would have found obvious to utilize SiO₂ coating of internal surfaces with the thickness of 3000A in order to prevent contamination of substrate while treating it in CVD apparatus of Muguresh with the reasonable expectation of success.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Michael Kornakov", with a stylized flourish at the end.

Michael Kornakov
Primary Examiner
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01/31/2005